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## BARNES & THORNBURG

P.O. Box 2786  
Chicago, Illinois 60690-  
2786  
(312) 357-1313  
(312) 759-5646 Fax

### BEFORE THE INTERNATIONAL BUREAU OF WIPO

Int'l. Application No.: PCT/US2004/009104

Int'l. Filing Date: 26 March 2004

Applicant: Purdue Research Foundation

Title: NANOFIBERS AS A NEURAL BIOMATERIAL

Inventors: Webster & McKenzie

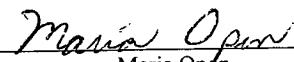
Attorney/Docket No. 3220-74751

Authorized Officer: Virginia Irby

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on March 29, 2005

  
Maria Opon

### ARTICLE 19 AMENDMENT

Madam:

In response to the International Search Report mailed January 27, 2005 and pursuant to Article 14, Applicant hereby encloses substitute claims 1-21. The application was published under A2 without the search report. The application has not yet been republished with the search report. The present communication is the letter required under the Rules to accompany the substitute claims.

Where originally there were 22 claims and the present amendments consist of cancelling some claims and amending some claims:

Claim 3 has been cancelled.

Claims 1 and 2 have been replaced by amended Claims 1 and 2. Original Claims 4-18

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Int'l. Appl. No. PCT/US2004/009104

Attorney Docket No. 3220-74751

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were renumbered, but otherwise left unchanged, to read 3-17. Claims 20-22 were renumbered, but otherwise unchanged, to read 19-21. Original Claim 19 was amended and renumbeed as Claim 18. No other changes to the claims have been made.

Respectfully submitted,

BARNES & THORNBURG

  
\_\_\_\_\_  
James B. Conte  
Attorney Registration No. 54,661

03 / 29 / 05  
Date

BARNES & THORNBURG  
P.O. Box 2786  
Chicago, Illinois 60690-2786

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## WE CLAIM:

- [C1] A neural implant comprising a device coated with a carbon nanofiber material.
- [C2] A neural implant comprising a device, wherein at least one component of the device is made of a carbon nanofiber material.
- [C3] The neural implant of claim 3, wherein the carbon nanofibers are about 2 to 200 nm in width.
- [C4] The neural implant of claim 4, wherein the carbon nanofibers comprise carbon nanotubes.
- [C5] The neural implant of claim 5, wherein the carbon nanotubes are functionalized.
- [C6] The neural implant of claim 5, wherein the carbon nanotubes are aligned.
- [C7] The neural implant of claim 1, wherein the implant is a neural probe.
- [C8] The neural implant of claim 2, wherein the nanomaterial comprises a matrix selected from the group consisting of polyurethane, polymethacrylate, polyester, polyvinyl and any copolymers thereof.
- [C9] The neural implant of claim 2, wherein the implant is a neural probe.
- [C10] A neural prostheses comprising an implantable device with a composite polyurethane carbon nanotube, the device capable of stimulating neuronal growth and minimizing glial scar tissue formation.
- [C11] The neural prostheses of claim 11, wherein the carbon nanotube comprises 2% to 100% of the composite.
- [C12] The neural prostheses of claim 11, wherein the carbon nanotube forms a carbon nanofiber.
- [C13] The neural prostheses of claim 13, wherein the carbon nanofiber is about 100 nm.
- [C14] Use of a neural implant that minimizes scar formation comprising:  
(a) obtaining a neural implantable device;  
(b) coating the implantable device with a nanomaterial; and  
(c) securing the implantable device in the neural tissue.
- [C15] Use of a neural implant that minimizes scar formation comprising:  
(a) obtaining a neural implantable device comprising a nanomaterial;  
and  
(b) securing the implantable device in the neural tissue.

[C16] A method of stimulating neuronal growth and minimizing scar formation by an implant in a brain, the method comprising:

- (a) obtaining a neural implantable device comprising a nanomaterial;
- (b) securing the implantable device in the brain; and
- (c) providing neuronal stimulants through the device.

[C17] An orthopedic prostheses comprising an implantable device coated with a composite polyurethane carbon nanotube, the device capable of stimulating osteoblast proliferation and minimizing fibroblast encapsulation.

[C18] A method of stimulating osteoblast proliferation and minimizing fibroblast encapsulation by an orthopedic implant, the method comprising:

- (a) obtaining an orthopedic implantable device comprising a carbon nanofiber material; and
- (b) securing the implantable device.

[C19] A method of selecting a nanomaterial suitable for implant, the method comprising:

- (a) determining structural dimensions of a biological molecule in a biological tissue; and
- (b) fabricating the nanomaterial whose surface structural dimension is similar to the biological molecule.

[C20] A method of claim 20, wherein the nanomaterial comprises carbon nanofibers of about 2-200 nm in width.

[C21] A method of claim 20, wherein the biological molecule is laminin.

**ABSTRACT**

[00092] Nanomaterials for neural and orthopedic prostheses are disclosed.

Composite carbon nanofibers enhance neuronal growth and minimize glial scar tissue formation. Methods and compositions to promote neuronal growth and minimize scar tissue formation during prolonged monitoring and treatment of neural tissue are disclosed. Composite polyurethane carbon nanofiber is a suitable material for neural implant. Composite carbon nanomaterials decrease adhesion of astrocytes and fibroblasts.